

# Middle leadership: A key role of numeracy reform



• **Robyn Jorgensen**  
University of Canberra, ACT  
[<robyn.jorgensen@canberra.edu.au>](mailto:<robyn.jorgensen@canberra.edu.au>)

A large national project that explored successful numeracy practices in remote and very remote schools has identified the significant role of numeracy leaders. As middle leaders they are able to bridge the gap between the vision of the school leadership team and the practices enacted in the classroom.

This paper reports on one aspect of a large national project that has been exploring the successful numeracy practices of remote and very remote schools. While there have been a number of significant findings, the middle leader has been identified as a key role in the development of successful numeracy/mathematics practices in schools. The middle leader plays a critical role in crossing the boundaries between the vision of the school and the practices that are enacted at the classroom level. The paper describes the findings from the project and then discusses implications for mathematics education, particularly in the context of remote education provision.

It is well known that many of the teachers coming into remote education are in the early stages of their teaching career, often as new graduates (Gagnon & Mattingly, 2012); there is high transience of teachers in remote communities (Hall, 2012), particularly in the areas of mathematics and science (Handal, Watson, Petocz, & Maher, 2013); along with issues of attraction and retention of teachers to work in remote and often hard-to-staff schools (Kelly & Fogarty, 2015). The context of remote education is well documented and the challenges are similarly prevalent in the literature. However, there are many valuable aspects to working in remote and isolated settings (Nash, Hooper, & Lochner, 2002) that must be acknowledged. The issues that have been noted in the research literature are long-standing (Preston, 2000) and there are many aspects to the challenges to provision of quality education in remote contexts (Roberts, 2005). This paper explores the role of middle leaders in remote schools to support teachers and to address many of the long standing issues around teaching quality in remote sites. The paper provides examples

of practice from various schools to illustrate the value-adding of middle leaders in these sites. There is considerable practical benefit in having strong middle leaders in mathematics education.

There is considerable literature on the impact of beliefs on teaching, particularly in socially and culturally disadvantaged contexts. Teachers try to make sense of the experiences and subsequent outcomes for their students (Allard & Santoro, 2008) while the beliefs with which teachers frame their orientation towards mathematics education in remote settings can influence their practice (Jorgensen, Grootenboer, & Niesche, 2013). Sarra (2011) has strongly and forcefully advocated, there is little room for deficit models of thinking and practice for Indigenous learners. He argues that teachers should have high expectations of Indigenous students and provide quality learning environments to realise the potential of their students.

There are many initiatives for the preparation of teachers working in remote contexts. In some states teachers are required to undertake an intensive induction program prior to commencing work in remote schools. Some communities have been strong in wanting strong cultural and language induction for teachers prior to working in their schools. Similarly, in preparing preservice teachers for working in remote contexts, many universities have implemented practicums in remote settings allowing students to gain a sense of the demands and positives of working in remote (and rural) contexts (Sharplin, 2002). Many strategies have been used to support early career teachers. There are also pitfalls including the reliance on individual teacher resilience (Sullivan & Johnson, 2012) to cope with the challenges that teachers confront in working in remote contexts. Similarly, issues around the

preparation of principals to undertake the demands of remote educational leadership have also been documented (Wildy & Clarke, 2012) and the models of leadership required in remote settings (Niesche & Jorgensen, 2010). One of the more troubling aspects of leadership in remote settings is the discontinuity of leadership and hence sustainability of programs (Niesche, 2013). Equally, the role of leaders in curriculum development and leadership at the implementation level (Sexton & Downton, 2014) needs to be considered.

Professional development within remote contexts is also problematic given the tyranny of distance and the early career status of most of the staff in remote settings. Accessing professional development can be very costly. Travel and time costs exacerbate the real costs for schools for accessing external ‘experts’ or for teachers to access professional development away from the school. Internet-based learning has been a particular resource that has been seen as a tool to overcome some of the issues related to professional learning. But as Harper (2012) cautioned, the adoption of digital /internet based resources are often troubling due to digital access in remote contexts and the professional cultures at the schools. An alternative has been for ‘experts’ within the school to mentor and work with their peers to share learning. This may be useful for larger schools, but problematic for smaller schools particularly when staffed with early career teachers. Some systems have provided significant support to remote schools for professional learning opportunities, and there have been considerable funds made available from the Federal Government to create opportunities for states and territories to provide for the professional learning in these schools. Similarly, the Federal Government created funded opportunities for external providers to create professional learning packages for schools.

These literatures alert us to a number of salient points in considering the development of quality mathematics/numeracy practices in remote settings, particularly in relation to development of quality teaching skills for new teachers whose first job is in a remote setting. Most notably, a key issue for schools is to build a strong culture of mathematics learning at the school when the staff is comprised of early career teachers, and where the opportunities to access external professional learning is very limited. This paper explores the practices of a number of schools in a large national

study on successful numeracy practices in remote Indigenous settings.

What has emerged from this study has been the important role of middle leaders in the schools. The role has helped to build a learning culture within the schools, along with a coherent approach across a school. The role has been instrumental in supporting new teachers in their careers and as such, the findings have implications for remote schools as well as schools in general.

## The study

The study<sup>1</sup> is ethnographic in form so seeks to document the practices of each school and then to produce a case study of that school. The collection of case studies is available on the project website<sup>2</sup>. Interviews, lesson observations and collection of school documents form the basis of the data collected at each site. The case studies are negotiated with the school, and once approved by the appropriate person at each school, the story is uploaded to the project website. At the time of writing this paper, a total of 32 case studies had been conducted. More case studies will be included in 2016. All interviews are transcribed and entered into *NVivo* which is a software package that enables a grounded theory approach to identify key themes and concepts, as well as anomalies, across the much larger cohort of schools. From the larger study, a further analysis is undertaken across the schools and major themes (and contradictions) will be identified. One of the major themes emerging from the study is the role, and value, of middle leaders within the schools.

## Middle leaders: Leading learning in numeracy

With many of the teachers in remote contexts being in the first or second year of their teaching career, and most teachers new to teaching in remote contexts, there is a considerable need for professional support and mentoring. But as noted in the preceding review, access to appropriate external staff can be limited due to the physical location of the schools. Most of the schools in this study have adopted a model of a numeracy leader within the school. This person has an instrumental role in building the skills of the teachers, ensuring the school vision is enacted, and providing

1. The study is funded by the Australian Research Council through its Discovery Research program.

2. The project website is: <http://www.canberra.edu.au/research/faculty-research-centres/stem-education-research-centre/research-projects/remote-numeracy>.

leadership in the numeracy/mathematical curriculum area.

Across the study, there have been quite different emphases in the schools. In some schools, there has been a focus on building the mathematical content knowledge of the teachers. In these schools, it was found that the teachers often had poor content knowledge, and often the secondary school teachers were teaching outside their discipline so were not confident with mathematical content. Equally, many of the primary sector teachers also had weak content knowledge. The ethos at this site was that if teachers had strong content knowledge, this would help build networks of learning and a strong pedagogy in mathematics. In contrast, other schools focused on a particular pedagogical model for teaching mathematics. For example, in one school the two successive leadership teams had taken a particular approach—that literacy and numeracy were core business and each had a 2 hour block each day. The final block in the day was allocated to other curriculum (and cultural) activities. It was seen that much of the mathematics could be transdisciplinary so other curriculum areas were covered in mathematics as well. In each numeracy block, the lesson had a formalised structure consisting of four distinct activities. These lessons were implemented across the whole school so students were familiar with how a lesson would progress regardless of the teacher or year level. This structure was seen to be of great value to the students as they were aware of what to expect, and hence could engage with any mathematics lesson, even if taught by another teacher. It was also a very explicit teaching approach so that teachers used a range of strategies to enable the students to be able to access mathematics lessons.

Across the schools, the project has been able to identify a number of key features of the middle leader role that appear to be instrumental in creating positive learning environments in the remote schools. These characteristics represent an amalgam of the qualities displayed by various numeracy leaders in the schools in this study. Some were more or less apparent in different contexts, but collectively they represent the strengths of the numeracy leaders across the study. It is this point that has considerable merit for schools considering reforming mathematics teaching and learning at their site. The middle leader within a school needs to be able to demonstrate, or develop, some key characteristics and roles if the development of quality mathematics teaching and learning is to be developed.

1. Middle leaders have strong mathematical content knowledge;
2. Middle leaders have strong mathematical pedagogical knowledge;
3. Middle leaders mediate the vision of the leadership team so as to enact the envisioned practices with the classroom teacher;
4. Middle leaders provide support and insights into collecting, using, interpreting and developing strategies based on evidence;
5. Middle leaders support teachers to develop differentiation strategies to cater for diversity within classrooms;
6. Middle leaders require a high level of trust, respect and autonomy from and of the staff ;
7. Middle leaders work with the leadership team to provide feedback and input into the future direction and needs of the school and mathematics programs;
8. Middle leaders need to make sense of the social, cultural and political contexts within which they work in order to make informed choices of the actions and reactions of their contexts and participants.

In terms of the classroom, the numeracy leader plays many roles to support the learning of teachers, and the development of quality practices. They provide considerable in-class support for teachers, most of which is very hands-on and practical. The support is shaped by the needs of the individual teachers who often request particular forms of support based on their particular circumstances and skills, as well as being shaped by the needs of the students in the classroom. Typically, support includes workshops after school around particular topics (e.g. mathematical content, pedagogy or the use of resources); provide teachers with feedback on lessons; model lessons to teachers; assist teachers in the collection of student data; support teachers to interpret the data and to build learning programs based on that data; develop programs with the teachers; and to develop effective assessment-for-learning strategies within the classroom. While there were differences across the schools, largely shaped by the context and culture within individual schools, there were synergies across the schools.

The roles and practices of the numeracy leaders were shaped by the expectations of the leadership team within a school, but equally by the larger context of the school. All schools in the study had large cohorts of early career teachers, so this was a consideration of

all schools as to how to best support new teachers in their first significant teaching appointment, while also ensuring that the teachers had high expectations of learning for their students. The numeracy leader played an instrumental role in supporting the new teachers and their transition into teaching as a profession as well as the transition into the culture of the school, community and mathematics education. In one school, for example, incoming teachers were provided with the first four weeks of mathematics teaching (a unit plan) so that the new teacher could transition easily into the school and the approaches desired by the school. By giving the incoming teacher an established unit of work, the teacher could focus on the immediacy of teaching without having to worry about planning and teaching concurrently. The unit plans enabled the teacher to work the desired model and so gain an orientation and familiarity with the whole-school approach. At the same time, the unit could be taught while the teacher could begin planning for the next month's work. This month-long unit plan was developed by the Numeracy Leader and was integral to the whole-school program/philosophy. The unit plan was also a quality document so that high expectations could be set for the teacher/s and their planning.

The numeracy leader was a mediator between the executive teams at the school and the classroom practitioner. Feedback from teachers suggested that the numeracy leader was a highly valued position, particularly when the appropriate person had taken on the role. By 'appropriate', it was seen that the numeracy leader had the many of the dispositions outlined in the earlier bullet points, but particularly around pedagogical content knowledge. The numeracy leader had to have authenticity in their role and the capacity to be able to work alongside the teachers as well as to provide critical advice. Often, where the numeracy leader was able to establish credibility among the teachers as an experienced teacher, this helped gain the trust and respect of the teachers. But this is not always possible given that many of the teachers in a school can be quite early in their careers—as teachers, as numeracy leaders or as principals. In one case, there was a cluster of schools which was staffed predominantly by early career teachers (and principals) so the numeracy leader was also in his/her early career as a senior member of staff. In this context, the numeracy leaders were supported by external advisors who were accessible by phone or email. This enabled the numeracy leader to access external advice for teaching, content and assessment as needed. In other cases, the numeracy leader had undertaken specialist training (in mathematics

and/or pedagogy), and/or had been a classroom teacher for some time. In these cases, they were seen to be legitimate curriculum leaders who were able to assume the responsibility for leading curriculum at the school due to their breadth of knowledge and practice.

The numeracy leader needed to have credibility to be valued and accepted by the teachers. This varied from having experience in mathematics education and /or indigenous or remote education. Those numeracy leaders that were most successful had a considerable repertoire of skills and experience in the teaching of mathematics so could provide very strong support for teachers. But as was noted by a number of the numeracy leaders themselves, it was important for them to also access professional learning so as to expand their repertoire and be better able to support teachers and inform the leadership team of innovations and research in quality practice in mathematics education.

In terms of the implications of these findings to mathematics teaching and learning more generally, and to the audience of this journal, it is apparent from this research, that the middle leader can play an important role in school in general. From this study, the roles and characteristics of the successful middle leaders can provide insights for schools seeking to develop quality practices, particularly in the development of a coherent whole school approach to mathematics/numeracy teaching. The middle leader can play an instrumental role in being able to enact the vision of the school while supporting teachers in their day-to-day enactment of quality teaching in mathematics. But as this study has foregrounded, there needs to be some personal characteristics of the middle leader as well as some clear roles that the middle leader plays within the school. These have been discussed in this paper.

## Funding the numeracy leader

As with any reform, funding is an issue. Central to this paper is the ways in which the middle leader can be built into the staffing profile of the school. Across so many of the schools in this study, the role of the numeracy leader has been integral to the success in the schools. Funding such a role is an issue for schools as this role is surplus to the usual funding models within the school sector and varies from state to state. In some states, the numeracy leader may be an identified (and funded) position on top of the usual expert roles in a school. In other states, there is no specific or targeted funding for the role. It was observed in a number of sites that the schools had valued the role

so significantly that funding allocations were managed so that the role could be funded and on-going. In one sector of schooling, the overarching organisation saw the need for a numeracy leader and independently sought funding to support teachers—at the school level and the systems level so that there was a leader within the school who was supported by a targeted numeracy consultant who would work with the leader and teachers within the schools. For example, in one remote school, the staff (collectively) agreed to make class sizes larger so that a teacher could be freed up to take the role of numeracy leader. Part of the innovation around funding the role is the perceived value of the role within the school. If a school sees the value in a middle leader to support staff in developing quality practices in mathematics/numeracy, then the role can be funded through various means—often driven by the perceived desire and need for the role.

## Summary

The research outcomes from this large study have shown the wide adoption of a targeted role within the schools to support the professional development of teachers while building a particular numeracy/mathematics culture within the school. The approaches adopted by the individual schools varied considerably, but the role of the numeracy leader tended to be relatively consistent across the schools that had adopted this role. Given the needs of schools to upskill teachers—most of whom are early career teachers—the targeted role enables this process to occur. The numeracy leader plays an important role in brokering the vision of the school and the practicalities of implementing that vision at the level of the classroom. A key role was to support the learning of the teachers through a range of scaffolding techniques. Across the study, these have been relatively consistent in terms of the roles undertaken by the leader—working closely with the teachers in the classroom in terms of lesson observations and feedback to teachers; modelling lessons for teachers; working with student data to build quality learning experiences targeted for individual students; and providing curriculum support and development for whole of school staff. The role is critical in enabling the school to act as whole as the mediating between the vision and the practices at the level of the classroom. There are caveats that have emerged through the study as well. These include that the numeracy leaders must have authenticity in their capacity to lead, both in terms of mathematics, pedagogy and assessment practices.

## Practical implications for schools and teachers

As an expansive research project, the findings described in this paper illustrate the ways in which the middle leader—vis a vis a numeracy leader—have brought about considerable positive change and practice in the schools. This paper has described the roles of the middle leader in embedding quality practices in mathematics. What is of value for schools considering bringing about reformed practices is that teachers need support to develop quality practice—in the context of this study but also more generally. What has been significant from this study is the role of the middle leader in schools and leading and supporting change. While there was considerable diversity in the roles across the schools, it was also apparent that there are some consistencies as well. These have been discussed. For schools considering reform, the points raised in this paper may well provide some guidance for schools and leaders as they explore the value of the middle leader role within the school context.

This role is particularly important in many remote schools where most of the staff are early career teachers for whom their position might be their first teaching position. Having access to a person who is able to support them in their transition into the teaching profession; support and develop their professional needs in teaching generally and in mathematics in particular; provide a strong link between the vision of school and the enacted practices within the classroom; as well as for supporting and working with Indigenous staff seems to be a strong catalyst in the development of quality, and sustainable, practices in the teaching of mathematics. But as noted in this research, the person also needs to have a strong knowledge of both mathematics and mathematical pedagogy if the role is to be a viable and productive one. What was seen as an important scaffold for the middle leaders was their own professional learning and how this is to be extended over time so as to be able to offer informed support to teachers.

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